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GENERATOR OF POWERFUL CURRENT PULSES, (U)

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JAN 78 F M SPEVAKOVA, A M STOLOV

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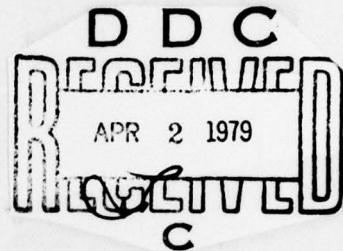
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## FOREIGN TECHNOLOGY DIVISION



GENERATOR OF POWERFUL CURRENT PULSES

by

F. M. Spevakova, A. M. Stolov



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## EDITED TRANSLATION

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By: F. M. Spevakova, A. M. Stolov

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PREPARED BY:

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	<b>А а</b>	А, а	Р р	<b>Р р</b>	Р, р
Б б	<b>Б б</b>	Б, б	С с	<b>С с</b>	С, с
В в	<b>В в</b>	В, в	Т т	<b>Т т</b>	Т, т
Г г	<b>Г г</b>	Г, г	У у	<b>У у</b>	У, у
Д д	<b>Д д</b>	Д, д	Ф ф	<b>Ф ф</b>	Ф, ф
Е е	<b>Е е</b>	Ye, ye; E, e*	Х х	<b>Х х</b>	Kh, kh
Ж ж	<b>Ж ж</b>	Zh, zh	Ц ц	<b>Ц ц</b>	Ts, ts
З з	<b>З з</b>	Z, z	Ч ч	<b>Ч ч</b>	Ch, ch
И и	<b>И и</b>	I, i	Ш ш	<b>Ш ш</b>	Sh, sh
Й и	<b>Й и</b>	Y, y	Щ щ	<b>Щ щ</b>	Shch, shch
К к	<b>К к</b>	K, k	Ь ъ	<b>Ь ъ</b>	"
Л л	<b>Л л</b>	L, l	Ы ы	<b>Ы ы</b>	Y, y
М м	<b>М м</b>	M, m	Ь ъ	<b>Ь ъ</b>	'
Н н	<b>Н н</b>	N, n	Э э	<b>Э э</b>	E, e
О о	<b>О о</b>	O, o	Ю ю	<b>Ю ю</b>	Yu, yu
П п	<b>П п</b>	P, p	Я я	<b>Я я</b>	Ya, ya

\*ye initially, after vowels, and after ъ, ъ; e elsewhere.  
When written as ё in Russian, transliterate as yё or ё.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	$\sinh^{-1}$
cos	cos	ch	cosh	arc ch	$\cosh^{-1}$
tg	tan	th	tanh	arc th	$\tanh^{-1}$
ctg	cot	cth	coth	arc cth	$\coth^{-1}$
sec	sec	sch	sech	arc sch	$\sech^{-1}$
cosec	csc	csch	csch	arc csch	$\csch^{-1}$

Russian	English
rot	curl
lg	log

0050

## GENERATOR OF POWERFUL CURRENT PULSES.

F. M. Spevakova and A. M. Stolov.

The invention pertains to devices for the generation of powerful current pulses, for example, for installations with adiabatic compression of plasma in magnetic traps. In such installations is required rapid growth of magnetic field and maintaining the prescribed magnitude of field for a time substantially exceeding the duration of the pulse front.

Various methods are known for solving this problem, for example, with the aid of short-circuit shunting of inductive load with maximum current in it. However, this method is unsuitable when the time constant of the circuit of the

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magnetic system is less than the required pulse duration.

In this case such a problem is solved with the application of a two-stage circuit.

The proposed generator of powerful current pulses is distinguished from those known by the fact that for providing rapid growth of current with subsequent maintaining of the current at a prescribed level, to the smoothing resistor and load through the second commutator is connected a shaping line, fed from a separate source, the voltage of which was selected so that relationship  $E_2 = E_1 (1 + \rho/R)$  would be fulfilled, where  $E_2$  - voltage of source, connected with line,  $E_1$  - voltage of source, connected with capacitance accumulator,  $\rho$  - characteristic resistance of line,  $R$  - magnitude of smoothing resistance.

On the drawing is provided the schematic diagram of the generator.

The first stage of the generator contains the power supply source  $E_1$ , which through charging resistor  $R_1$  is connected is connected to capacitance accumulator  $C_0$ . The last through commutator  $K_1$  and smoothing resistor  $R$  is

connected to load  $L_0$ .

Furthermore, there is a second stage, containing power source  $E_2$ , charging resistor  $R_2$  and a line, formed by elements  $L$  and  $C$ . The line through commutator  $K$  is connected to load  $L_0$  and smoothing resistor  $R$ .

The generator operates in the following manner.

After charging of capacitors to voltage  $E_1$  and  $E_2$  there is switched on commutator  $K_1$ , and current in the load rapidly rises. After reaching maximum value of current commutator  $K_2$  is switched on, as a result of which the current is kept constant for a time determined by the parameters of the line.

The condition of constancy of current in this interval is  $E_2 = E_1 (1 + \rho/R)$ , where  $\rho$  - characteristic resistance of the line.

A distinguishing feature of the proposed circuit is the high use of energy of the system. The energy of capacitance accumulator  $C_0$  almost completely converts into energy of the magnetic field, and the energy of the line

with  $R = \rho$  is practically all consumed for covering the active losses in the load. As calculation shows, the energy utilization factor can reach up to 98 %.

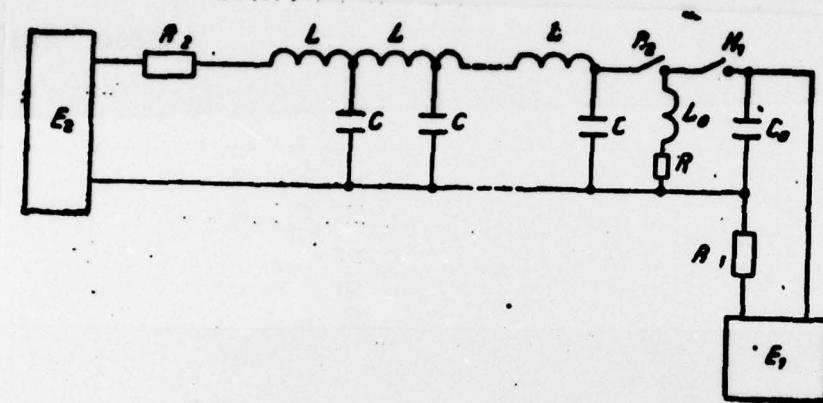
#### SUBJECT OF INVENTION

Generator of powerful current pulses, containing a power source, connected through charging resistor to capacitance accumulator, which through commutator and smoothing resistor is connected to a load, is distinguished by the fact that for providing rapid growth of current with subsequent maintaining of current at a prescribed level, to the smoothing resistor and load through a second commutator is connected a shaping line, fed from a separate source, the voltage of which is selected so that relationship  $E_2 = E_1 (1 + \rho/R)$  would be fulfilled, where  $E_2$  - voltage of source connected with line,  $E_1$  - voltage of source connected with capacitance accumulator,  $\rho$  - characteristic resistance of line,  $R$  - magnitude of smoothing resistance.

DOC = 0050

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Figure.



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C510 AIR MOBILITY R&D LAB/FIO	1	E413 ESD FTD	2
C513 PICATINNY ARSENAL	1	CCN	1
C535 AVIATION SYS COMD	1	ETID	3
C591 FSTC	5	NIA/PHS	1
C619 MIA REDSTONE	1	NICD	5
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